

RESEARCH ARTICLE

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The role of temporariness, emptiness and improvisation in uncertain times: evidence from urban responses to COVID-19

Sara Caramaschi¹ and Alessandro Coppola^{1*}

Abstract

This paper focusses on the complex relationship between vacancy, temporary responses and uncertainty during turbulent times by analysing how a selection of cities—New York City, São Paulo, Milan, Moscow, Abu Dhabi, Esfahan, Karachi, Mumbai and Jakarta—addressed testing, treating, isolating and vaccinating the public in response to the coronavirus (COVID-19) pandemic. These highly visible spatial responses offer immediate, pragmatic answers to unexpected conditions and, we argue, allow a more nuanced understanding of how planning might leverage flexibility and adaptability in a (post-)pandemic world.

Keywords Temporary urbanism, COVID-19, Vacancy, Uncertainty

Introduction

In scholarly debates about cities in the context of crisis or disaster, there is an inherent tension between spaces and the spatial relationships that emerge from the direct effects of these crises; from the outcomes of rapid improvisations in the face of emergency and uncertainty; and from longer term plans, projects and processes. The coronavirus (COVID-19) pandemic presented a new, massive test of how policymakers conceive, navigate and interpret these tensions. As argued by Andres et al. (2021), the pandemic showed once more how ‘cities and urban spaces must be able to cope with change and adaptability by facilitating processes of smooth transformation in line with very diverse, rapid, or slower disruptions, of various natures and strengths’ (p. 168). The severe and sudden disruption caused by the spread of the virus, as well as the need for immediate and rapid adaptation, has reinforced the role of temporary solutions in response to specific needs and concerns (Deas et al. 2021;

Law et al. 2021). Andres et al. (2021) suggested that temporary urbanism in response to COVID-19 may have significant policy relevance, as ‘it is based on soft and swift transitions’, helping cities ‘to respond rapidly to the introduction of effective pandemic control measures while functioning at full capacity during pandemic-free periods’ (p. 173–174).

Indeed, improvisation was applied by policymakers as part of the wider public health response. In this sense, the pandemic showed everyone the need for urban policymaking and spatial planning to cope with the risks facing global society (Beck 2006)—risks that, in an increasingly urbanised world, turn cities into the maximum points of exposure and vulnerability to all sorts of threats (Graham 2010). The rise of radical uncertainty and the growing significance of the unknown (Abbott 2005) pose existential challenges for spatial planning and urban policymaking, urging them to go beyond a technically optimistic approach to finding future solutions and strategies (see Balducci et al. 2011). Accordingly, ideas related to urban resilience (Coaffee and Lee 2016; Balducci 2020; Lakoff 2007), preparedness (see Armondi et al. 2023) and anticipatory governance (see Pellizzoni 2011) became very popular among urban scholars and policymakers. For

*Correspondence:

Alessandro Coppola
alessandro.coppola@polimi.it

¹ Dipartimento di Architettura e Studi Urbani, Politecnico di Milano, Milan, Italy



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these approaches, what is key is building a broad institutional and societal capacity to respond to all sorts of stress and shock. Different from contingency planning and emergency management, the approaches of preparedness and resilience do not focus exclusively on preparing for the manifestation of a specific risk but rather on building the multidimensional capacity to face any manifestation of risk. Although pandemics have happened in the past and are a known risk (Lakoff 2017), most cities were little prepared for an event of such a scale as the COVID-19 pandemic and had to improvise their response, pooling all possible resources, mobilising existing actors and patchworking policies and regulations.

A very specific form of urbanism manifested in such a context, a form we may define as *pandemic urbanism*. As compared to other, more frequent, disasters—such as earthquakes, floods or wars—the COVID-19 pandemic did not result in the mass evacuation of cities. The population was kept in place while cities were downsized to contain only their residents while mobility was reduced to almost zero, changing the fundamentals of the population's relationship to the urban space. Policymakers managed a situation in which most ordinary functions simply could be not performed—if not digitalised—while available space had to serve new functions related to the emergency. More specifically, this form of pandemic urbanism worked along three closely intermingled dimensions. The first dimension constituted a massive, planetwide exercise of the digitalisation, freezing, dematerialisation and domestication (i.e., placement in domestic environments) of traditionally urban activities (Bryson et al. 2020; Coppola 2021; Grant 2020; Reuschke and Ekinsmyth 2021). This exercise was the outcome of a variety of spatial management and governance strategies that were put in place at multiple scales by different actors. Containment regimes aimed at limiting the spread of the virus by curtailing the mobility of people were ubiquitous and characterised by different rationalities and forms of implementation at the national, regional and local levels. At the urban level, such exercises implied the temporary vacating of a wide array of buildings, which were left idle and with no function; from hotels to cultural venues, from sports centres to office towers, pandemic urbanism represented a condition of the sudden, widespread oversupply of structures that, under certain conditions, also became essential platforms for the development of solutions aimed at responding to the care needs posed by the pandemic.

The second dimension involved the setting up of structures aimed at supplying services related to the health emergency or to the implications of the measures activated to limit the spread of the virus (Deas et al. 2021; Law et al. 2021). From new hospitals to quarantine

centres, we witnessed the rapid deployment of services characterised by different levels of permanence and investment. These came to be essential public infrastructure during the pandemic. The third and final dimension involved the design and implementation of spatial and structural solutions—that is, design solutions in public spaces, such as parklets or bike lanes—aimed at lowering health risks while allowing the return to urban life in the context of the temporal extension and chronicisation of the pandemic (Stevens and Dovey 2022).

The temporality and spatiality of these three dimensions are closely interwoven. While governments were imposing spatial containment regimes, they were already planning for temporary structures aimed at addressing health needs. Likewise, while they were putting in place new street design arrangements, they were still operating health-related temporary structures and enacting some spatial containment measures. Naturally, the specific forms assumed by this pandemic urbanism were the outcome of, and responded to, different policy choices as well as the highly localised governance and institutional arrangements that enacted them.

This paper argues that pandemic urbanism has represented an advanced form of societal response in the face of radical uncertainty, taking the form of a deeper engagement with a new spatial and temporal organisation. In particular, we argue that policymakers have reinterpreted the complex relationship between temporariness and vacancy, pushing practices further ahead of what had been previously experienced. This makes the COVID-19 pandemic relevant for scholarly debates in urban planning and policymaking related to temporariness and vacancy. To discuss this issue, we focus on what we have dubbed the *second dimension* of pandemic urbanism—that is, the organisation of the testing, treating, isolating and vaccinating of the public through structures that have variably leveraged temporariness and vacancy. The paper is organised as follows. First, we define the context of the scholarly debate by situating it within the relevant strands of literature on temporary urbanism and vacancy in times of crisis and disaster. Second, we present the materials and methods used within this study. Third, we review relevant interventions across a variety of cities, analysing the relationship between vacancy, temporary solutions and uncertainty. Last, we discuss the findings and present our conclusions.

Leveraging vacancy in response to crisis: temporary solutions in times of disruption

Recent decades have witnessed a significant resurgent of interest in vacancy and temporariness in urban scholarship and popular discourse. *Vacancy* has been interpreted as a structural outcome of spatial relations under

capitalism wherein cycles of investment and disinvestment continuously produce uneven conditions of development and, therefore, built environments increasingly devoid of exchange and/or use values (O'Callaghan and Di Feliciano 2021). Temporary uses, solutions and practices in the urban space have historically developed in contexts where emptiness (at both the urban and building scale) has offered opportunities to stimulate a reaction by different actors (e.g., urban planners, grassroots groups, the general public) at times of uncertainty. Indeed, vacancy is the most visible by-product of a disruption, and temporary solutions provide tactics and strategies that either cope with the downturn or facilitate long-term interventions. In shrinking cities, the temporary use of vacant land has provided communities with solutions to counteract the general state of decline, the loss of meaning and the lowering quality of life (see Hollander et al. 2009; Coppola 2012). In post-2008 crisis cities, vacancy became increasingly visible and politicised, highlighting temporariness as a vehicle for boosting empty properties and making redevelopment—and a new cycle of accumulation—eventually possible (see Bishop and Williams 2012).

The *temporary* can thus be defined as 'processes, practices and policies of and for spatial adaptability' (Andres and Zhang 2020, p. 1) activated in response to disruptions. Much of the previous scholarship has focussed on temporary solutions during times of economic downturn or longer-term decline, although many temporary practices have a wide and longstanding presence in cities (see Németh and Langhorst 2014). Accordingly, temporary solutions have included the reuse of abandoned buildings for cultural production (Haydn and Temel 2006; Overmeyer 2007), the occupation of empty lots by urban gardens (Coppola 2012; Oswalt et al. 2013; Till & McArdle 2015) and the revitalisation of public open spaces through bottom-up and guerrilla practices (Douglas 2014; Hou 2010).

Temporary urbanism has been increasingly associated with the transformations encountered by urban environments in the twentieth and twenty-first centuries. Forms of the short-term use of urban spaces led to unexpected phases of urban development and renewal, marking a shift in the political discourse in the representation and acceptance of temporariness in cities (Webb 2018). The emergence of specific kinds of temporary urban practices—both bottom-up and top-down practices—have attracted the attention of researchers and commentators, who have analysed the boundaries, evolutions and contradictions of the so-called temporary urbanisms (Andres and Kraftl 2021; Madanipour 2018; Zhang and Andres 2020). *Temporary urbanisms* refer to the multiple entangled and situated processes, mechanisms and approaches

related to the making of urban places—an overlapping of actions and strategies aimed at reclaiming necessary spaces and coping with uncertain times. In major cities of the Global North, temporary uses and practices have been elevated by urban commentators and policymakers as commonly used practices, raising questions about their instrumentalisation and co-optation (see Bragaglia and Rossignolo 2021; Caramaschi 2020, 2023). Being activators and, hence, value providers, the trajectory of many temporary interventions has been raising awareness about their challenges and limitations. Indeed, temporary urbanism has ironically become a new form of top-down strategic planning used by both the state and the private sector (Andres 2013; Colomb 2012), serving as a vector of gentrification and neoliberal planning.

Alongside this, a less developed line of research focusses on the role and meaning of vacancy and temporariness in responding to natural disasters (Boano 2009; Félix et al. 2013; Johnson 2007). Here, the trajectory and operation of temporary urbanism is influenced by the nature and significance of the event itself and by the spatial and governance circumstances. Processes of urban and building emptiness characterise post-disaster contexts as well. These stem from both emergency measures (i.e., vacancy produced by the disaster) and post-disaster reactions (i.e., vacancy produced by reconstruction and recovery), unfolding different opportunities and pitfalls for temporary solutions. In these contexts, vacancy plays the role of a strategic resource, enhancing the possibility of a range of interventions, from the emergency management phase to the reconstruction and recovery. Accordingly, temporary solutions take on many physical forms, from makeshift to more elaborate prefabricated buildings. The forms of provision are equally varied, as transitional services may be provided through centralised top-down means or self-built by the affected communities themselves (Fois and Forino 2014). Temporary solutions thus encompass a variety of activities, practices and processes that may be designed or designated as temporary or 'pop up', which turn into spaces in waiting or even permanent developments (Moawad 2020).

To illustrate, if not destroyed or damaged by the disaster, empty buildings and vacant lots can be used to host local communities, activities and services dislocated by the same disaster. Emergency sheltering strategies commonly include the use of social infrastructures made vacant by the emergency such as schools, gyms and exhibition centres and, potentially, of existing previously vacant residential buildings. Also, vacated public and open spaces can be used for these purposes through the setting up of light structures. Such solutions are a very common response to the immediate effects of a range of different shocks (e.g., earthquakes, climate disasters,

intensely concentrated migratory fluxes and war events) and are rarely a source of controversy (Hany Abulnour 2014).

In contrast, longer term post-emergency temporary housing solutions have been criticised 'for being unnecessary, too expensive, too late, too long-lasting and drawing resources away from permanent reconstruction' (Cassidy 1999, p 36). Such projects are often promoted in the framework of emergency regimes that, in time, can overcome standard planning regulations (Coppola et al. 2021b). They also often rely on pre-existing, standardised solutions designed by national and international actors with little scrutiny, participation or respect for the sense of place of the people involved (Lopez-Carresi et al. 2013). Integrating with the existing urban fabric often proves problematic, as these interventions can fuel uneven geographies of emptiness with relevant impacts on the quality of life of the people using them and on the overall quality of the built environment. More widely, processes of vacancy, abandonment, and ruination appear to be a structural by-product of how emergency and recovery are conceived and implemented in the post-disaster (Caramaschi and Coppola 2021).

Temporary uses in response to crisis and natural disasters share commonalities in urgency, adaptive reuse, and community engagement, yet they differ in causes, duration, scope of impact, and resource allocation. While both situations involve temporary responses, the duration may also differ significantly. Temporary uses in response to crisis may be more protracted, implemented and normalized (see Ferreri 2021), whereas responses to natural disasters vary depending on the extent of damage and recovery efforts. These differences reflect the distinct challenges and priorities associated with each type of disruption, influencing the nature and execution of temporary use initiatives aimed at mitigating their impacts on affected communities.

In the context of the COVID-19 pandemic, vacancy proved to be tactically and strategically decisive for activating temporary responses (Deas et al. 2021; Law et al. 2021) in ways and at a scale without precedent. Streets, buildings and open spaces had to adapt to unprecedented times to allow new uses and regulations. According to Andres (2021, p. 6),

Stadiums, conference centres and parking have been transformed into temporary recovery facilities and hospitals, hotels have been used as quarantine centres or to house homeless people and ice rinks and air hangars have been used as temporary mortuaries. Public spaces and street furniture have been also radically changed to allow social distancing (e.g. wider pavements and footpaths), maintain economic activities (e.g. restaurants using pavements for outdoor dining) and accommodate

new individual mobilities (temporary cycling lanes, one-way circulations in parks, etc.).

In such a context, the understanding of temporary uses and of vacancy have been questioned, as uncertainty has turned the entire urban space into an *interim space*, subject to continuous, intermingled adjustments.

Materials and methods

The evidence reported in this study is based on the work of a research training studio coordinated by the authors. The studio involved international master's students in architecture and spatial planning at the School of Architecture, Urbanism and Building Engineering of the Polytechnic of Milan in Italy. The data collection process involved various sources of evidence (i.e., media news, social media, policy documents, archival records and observations) and occurred between September 2020 and December 2022. The group identified health-related temporary structures in a selection of contexts considering four main functions: testing, hospitalisation, quarantine and vaccination. The included cities were selected based on a variety of criteria: the inclusion of both Global North and Global South localities; the significance of the pandemic's effects in terms of exposure, vulnerability and public response; the presence of health-related temporary structures variably engaging with vacancy; and the accessibility of relevant media, direct and indirect observations, and grey literature in languages spoken by group members.

The selected cities were New York City, São Paulo, Milan, Moscow, Abu Dhabi, Esfahan, Karachi, Mumbai and Jakarta. The analysis focussed on exploring the wider urban contexts of the crisis in terms of the governance models of the pandemic response; the impacts of, and reactions to, COVID-19; the main issues and conflicts; the different temporary solutions in four identified realms—testing, hospitalisation, quarantine and vaccination—set up by local authorities or other levels of government. More specifically, each project was enquired in relation to three main analytical dimensions: the relation to vacancy in terms of the ways in which each project implied or not the use of vacant spaces and structures and of what kind; the level of physical investment in terms of how and how much involved spaces and structures had to be adapted if not transformed to host the new pandemic-related function; the temporality of the interventions in terms of how their duration was framed and implemented from outright permanence to various degrees of temporariness and/or intermittence. The results of the analysis were collected and organised in comparable city reports. Then, the team moved to extract all results from city reports to form distinct analyses

dedicated to the four functions (i.e., testing, hospitalisation, quarantine, and vaccination).

At first, the research was primarily structured by city, allowing us to compare them (see Table 1). However, as we aimed to discuss in an exploratory manner how temporary urbanism and vacancy have played a strategic role in the face of radical uncertainty, the team later focussed on general trends, extremes and variations among the uses of vacant assets through temporary solutions in relation to the four functions analysed. Finally, the cases most able to illustrate such general trends, extremes and variations were chosen for the writing of this article.

Results

A look at COVID-19 temporary structures and their relationship with vacancy

Testing and screening

Temporary structures aimed at testing and screening developed rapidly in the cities involved in this research. At the beginning of the pandemic, making testing widely available was a necessary strategic advance, as it was the precondition for tracing and containing the virus' spread. In locations first hit by the pandemic, the capacity of pre-existing, standard health structures was rapidly outdone, especially when testing became available on a mass scale. Therefore, new temporary structures had to be put in place.

In cities of the Global North, the spread of self-testing since November 2020 and the progressive inclusion of widespread locations in the testing networks (e.g., pharmacies) dramatically reduced the need for temporary structures dedicated to this function. However, their organisation, modes of provision and significance also changed rapidly due to innovation in the available testing technologies. In particular, the significance of temporary testing structures must be viewed in relation to the complexification of the types of testing available (i.e., viral tests and antibody tests), their different levels of effectiveness and their direct accessibility by individuals. An additional factor to consider is that the most reliable tests required the presence of a specialised personnel.

Most temporary testing and screening interventions required the use of spaces, buildings or structures that were vacant because of the pandemic or, in a minority of cases, that sat idle before the crisis. Interventions tended to occur through low-intensity physical investments associated with structures that could be easily dismantled; one array of interventions involved setting up testing stations in buildings such as community centres, exhibition centres and malls made vacant by social distancing measures. New York City was, in this regard, one of the most relevant cases, as many buildings such as museums, schools and even churches

were refunctionalised as testing and screening centres. Also, temporarily decommissioned transportation hubs were used, as in the case of Moscow's subway stations and Mumbai's rail station and airport. A minor strand of solutions involved setting up variably light structures and/or containers in open spaces, such as squares and playgrounds, while a more widespread solution involved setting up drive-through testing centres in large parking areas—as in the case of Milan—or similar walk-in testing centres—as in the cases of Mumbai, Karachi, São Paulo and New York City.

The use of more intensive investments was rarer, with the only such case occurring as part of a specific intervention in Abu Dhabi, where new, longer term structures were rapidly constructed through an initiative of a large biotechnology corporation in the area of Masdar City, with the aim of expanding test processing and sequencing capacity. At the other extreme, we identified the use of cars and vans for performing tests in multiple locations in a specific timespan (e.g., Jakarta and Abu Dhabi) and even medical personnel performing tests at home, as happened in Karachi.

As screening is the most quantitatively relevant action to perform early in a pandemic, testing projects required a particularly strategic approach to locational choices. Policymakers had to balance spatial relevance with the level of investment in the physical space, as well as the rapidity of the setup process. The locational choice and the testing infrastructure depended heavily on the locally prevailing mode of urban mobility (e.g., car dependency), settlement type (e.g., compact or dispersed, and level of urbanisation) and overall availability of private means of transportation. This underlines the highly situated, context-dependent nature of temporary interventions across different urban morphologies and spatial organisation models. Proximity to certain areas or social groups especially at risk of contagion was also considered, as in the case of highly segregated workers' camps in Abu Dhabi. Another peculiar feature of testing projects is their high likelihood of being integrated with other functions—especially, but not uniquely, hospitalisation.

Vacant assets—including those made vacant by the disruption and those vacant beforehand—proved to be crucial, as they enabled a highly adaptive variation of temporary solutions aimed at managing unplanned and evolving functions, such as testing and screening. The availability of large vacant structures also represented an opportunity to integrate other functions, such as hospitalisation or quarantine. To illustrate, over time, the largest temporary intervention in Karachi was located in the vast, vacated Expo Centre, which hosted testing, isolation, treatment and vaccination sites.

Table 1 Overview of case studies and their responses to Covid-19

Case	Testing and screening	Hospitalization	Quarantine	Vaccination	Number of cases analyzed
Esfahan	Screening centres in existing hospitals	Temporary structures (Sepahan Shahr) and in the southwestern side of the city Alteration to existing hospital (Al-Zahra)	Conversion of labour camps into quarantine spaces	Temporary vaccination centres in open spaces Reuse of existing international exhibition centre Alteration of existing clinics Vaccination centres in existing hospital and clinics	16
Moscow	Testing centres in existing hospitals and clinics Express testing in metro stations	Prefabricated new contagious disease hospital Modular infectious disease centres (Troitsky and Novomoskovsky) Alteration to existing hospital (Kommunarka) Pre-fabricated temporary hospital complexes (Sokolniki, Krylatskoye, VDNKh) Temporary hospital in Athletes Village Kemayoran		Vaccination centres in existing buildings (Luzhniki sport complex, Red Square)	51
Jakarta	Movable structures in existing buildings		Ad-hoc quarantine space in existing public facilities—halls, schools, hotels Alteration of existing living quarter (Athletes Village Pademangan)	Ad-hoc vaccination centres in existing structures and spaces	59
Mumbai	New dedicated laboratories in public hospitals Vehicle and cargo container-based mobile labs Testing and screening in transport hub Screening camps in public spaces	Conversion of residential flats into COVID hospital for cops by police forces Conversion of existing buildings for asymptomatic patients Treatment and isolation ward using train coaches Expansion of existing hospitals Temporary hospital tents in sport complex (Pacaembu & Ibirapuera) Temporary field hospital in open spaces and convention centres Conversion of public schools in favelas	Temporary quarantine space (Byculla Covid Centre)	Movable structures in public spaces	37
São Paulo	Movable structures in public spaces for walk-in or drive-in testing Testing service in existing pharmacies		Reuse of hotels and empty apartments Conversion of public schools in the favelas	Drive-through vaccination in Pacaembu Stadium parking lot	20

Table 1 (continued)

Case	Testing and screening	Hospitalization	Quarantine	Vaccination	Number of cases analyzed
Milan	Reuse of existing structures	New temporary structures (Fiera Milano)	Reuse and/or alteration of existing structures—hotels	Reuse of existing structures (Palazzo delle Stelline)	18
Abu Dhabi	Movable drive-through structures in open spaces		Use of vacant elderly residences		48
	Reuse and alteration to existing hospitals and clinics	Field hospital with light structure (Al-Razeen)	Conversion of labour camps into quarantine spaces (Al-Razeen)	Reuse and/or alteration to existing hospitals and clinics	
	Temporary tents for drive-through testing				
	Mobile clinics				
Karachi	New dedicated laboratory in Masdar				20
	Temporary assessment/screening centre in open spaces (National Exhibition Center, Masfah Industrial Zone)				
	Relief camps in open spaces	Conversion of Expo Center into integrated facility (Karachi Expo Centre)	Conversion of hotels and guest houses	Temporary structures in Karachi Expo Center's Southern Wing	
	Drive-through test centres from movable containers			Drive-through vaccination centre	
New York City	Mobile labs			Ad-hoc vaccination centre in open space and existing structures (campuses, halls, hospitals)	60
	Temporary structures in public buildings	Temporary treatment facility in churches	Quarantine spaces in public spaces	Vaccination in Javits Centre	
	Testing centres in churches	Makeshift hospital in Javits Centre		Vaccination centres in public buildings—stadium, museum sports and exhibition halls	
	Drive-through testing facility	Makeshift hospitals in sports halls		Drive-through vaccination centre	
		Central Park field hospital			
		Hospital ships			

Hospitalisation

Hospitalisation represents the core function among those under examination in this study. The very conceptualisation of the pandemic as an emergency can largely be attributed to the risk it represented in terms of overburdening the pre-existing hospital capacity. The construction of Wuhan's temporary hospital in January 2020 (Fang et al. 2020) has been perceived as both a global signal of the seriousness of the emergency and a standard for the rapidity and scale in the deployment of new hospitalisation resources elsewhere. However, besides highly visible—and at times intentionally symbolic—projects, a widespread response to the increased need for hospitalisation resources was the expansion of the bed capacity in existing hospitals and the setting up of a wide range of temporary solutions in other situations. It is important to underline that these solutions responded to very different levels of severity in terms of disease symptoms and implied a variety of levels of medical support.

Among the cities examined, most temporary hospitalisation projects involved setting up healthcare facilities in vacant buildings, public spaces and open areas. These spaces included schools (e.g., São Paulo), convention and exhibition centres (e.g., New York City and Karachi) and, less frequently, trains and ships (e.g., Mumbai and New York City). Open spaces were also occasionally used for this function, as in the case of the field hospital set up in Central Park in New York City, which operated from April to May 2020 and ignited conflicts stemming from the limitations it imposed on one of the few possible urban activities at the time (i.e., recreation in a park).

Accordingly, the level of physical investment varied between projects. When vacant open spaces were used temporarily—whether in connection with an existing hospital or not—temporary structures were erected using light materials (e.g., tents or pre-assembled containers). In situations where existing structures were converted into temporary rapid-assembly emergency hospitals, the solutions involved varying levels of investment that depended mainly on the layout and equipment required for each project; these were largely related to the severity of the cases that needed to be addressed and the relative technological needs. For example, in Milan the conversion of a site from an exhibition centre into a COVID-19 temporary hospital reserved for severe cases required the development of oxygen and electricity systems, the building of temporary walls and the installation of services for patients and workers. This project became controversial, as—given the consistent investment in time and resources needed—it opened after the peak number of severe and critical patients was reached, when hospitals were again able to manage the cases; further, the new structure was neither integrated with nor did it

neighbour a pre-existing hospital, at a time when personnel were especially scarce.

Overall, the reviewed hospitalisation projects used different technologies and variably labour-intensive modalities, which were widely dependent on the type of vacant space available, the level of resources and the capacity characterising each context. The temporary conversion of vacant sites and buildings to serve only mild and moderate patients was the most common way to conceive and implement temporary hospitalisation projects. To illustrate this, churches, convention centres and open spaces in New York City, schools in São Paulo and housing for athletes in Jakarta were used as temporary hospitals, allowing for equipment costs to be kept low and avoiding the risk of the temporary hospitals being ready too late to address the highest level of demand.

In Mumbai, patients with severe cases were treated in pre-existing structures, while other vacant buildings (i.e., hotels and guest houses, police stations and public housing dwellings) were set up to supply lower levels of medical support. In contrast, longer term and higher intensity investments were made in other areas, as in the case of the permanent modular hospitals constructed in São Paulo and Moscow, signalling the possibility, under certain circumstances, of leveraging the emergency to implement longer term, previously conceived plans. Elsewhere, the temporary extension of existing hospitals was the preferred solution in contexts where health personnel—and particularly highly specialised ones—were in short availability (e.g., Al Zahra in Esfahan). In such cases, the spatial integration of new temporary structures with pre-existing institutions was critical.

This variability was also relevant in terms of regulating the temporality of interventions. Temporary hospitals functioned at a capacity that followed the varying level of demand determined by the successive pandemic waves. Therefore, the timeliness and promptness of the interventions were vital to their effectiveness, and at times, these were at odds with the level and time of investment needed to set them up.

Quarantine

Quarantine was the function for which highest level of variability was observed across the different contexts. Over time, housing—and especially multiple occupancy housing or situations in which many people must live in close proximity—was one of the key battlefronts of the pandemic, and ensuring the isolation of as many cases as possible was a key priority. Furthermore, quarantining was associated with the regulation of supra-local mobility, as travellers were asked to comply with strict isolation regimes upon their arrival in certain locations. As an extreme case not included in this research, in

Guangzhou, China, a move aimed at reducing residents' exposure to imported cases involved the construction of a 5,000-room quarantine centre for overseas arrivals. The massive complex took less than three months to be built from scratch on the outskirts of the city in mid-2021 (Gan and Yeung 2021). Temporary projects related to quarantine proved to be particularly relevant to our study, as they mainly involved the reuse of vacant and empty buildings. In particular, hotel rooms and other unused accommodation facilities were the target of many projects across the studied cities. As the least complex function in terms of technological intensity and need for specialised personnel and financial investment, temporary quarantine centres mainly involved a greater reliance on agreements among local governments and private stakeholders.

The implemented temporary quarantine solutions depended on many contextual conditions. Cities in which there was a great need for quarantine centres because of widespread overcrowding also had the fewest resources to set up new temporary structures and agreements to temporarily use privately owned vacant buildings. Accordingly, contexts in which the overall housing conditions were better—and the ratio of single-person households was higher—had a lower demand for such spaces. The standard practice for designating quarantine sites was the signing of agreements with both private providers of beds and public institutions. In New York City, the local administration charged a private intermediary with finding up to 30,000 hotel rooms that could be converted into quarantine centres. This strategy was deemed a 'de-densification strategy' and proved to be of great importance, especially for the city's homeless population, whose use of collective shelters had become problematic in terms of the high rate of infection.

Although in more limited numbers and with a less strategic effort, comparable initiatives targeting hotel rooms were deployed in other cities (e.g., Milan, Mumbai and Karachi). In Jakarta, part of the aforementioned athletes' village was reserved for the quarantining of Indonesian travellers coming from abroad. Using hotel rooms for quarantine is arguably not a proper temporary use strategy, as the assets ultimately perform their intended function, although in the context of a different arrangement—one in which public institutions assume the role of channelling demand and covering the financial cost of the rooms' use. In Mumbai, as rail traffic was completely interrupted, idle train coaches were used as quarantine centres, with only minimal interventions required, such as the reduction of the number of beds in each compartment.

In Abu Dhabi, quarantining was managed at the urban scale, as the intention was to insulate sections of the

population who were overwhelmingly hit by the virus—namely, the hundreds of thousands of migrant workers living in segregated settings. In this extreme case, the temporary solution was the conversion of entire housing settlements in which migrants were housed into quarantine facilities, although catering to the same population. In al-Razeen, for example, two out of four migrant workers' barracks settlements were converted into quarantine centres and hospitalisation spaces. A similar approach was taken in Esfahan. In Mumbai, in addition to the aforementioned solutions, a 37-acre green area close to the large, dense, informal settlement of Dharawi was turned into a 1,200-bed quarantine facility. In São Paulo's informal areas (i.e., *favelas*), vacant schools were instead used as quarantine centres.

Vaccination

The distribution of COVID-19 vaccines changed the course of the pandemic as well as the significance and temporariness of the other types of temporary structures. Since the start of the global inoculation campaign (November to December 2020), countries worldwide have experienced unequal access to vaccines and varying degrees of success in administering doses (Pilkington et al. 2022). In the early months of vaccination, countries with the highest incomes set up mass-inoculation sites. These temporary interventions had simple layouts and equipment, assuring privacy and accessibility, as well as flexibility and transformability in case of further needs. Structures designated to host the vaccination campaigns were deployed—in some cases, existing medical facilities were altered (e.g., Abu Dhabi, Esfahan and Moscow), public and private buildings (e.g., Milan and New York City) or exhibition sites (e.g., Esfahan and Karachi) were reused, temporary light structures were set up in open spaces (e.g., Mumbai, Jakarta, and Moscow) or drive-through facilities were established (e.g., Karachi, Abu Dhabi, and São Paulo). Overall, these spaces were chosen for either their ability to accommodate a lot of people at one time or for their location, characteristics, availability or readiness.

Karachi, for example, established 11 mass vaccination centres, which included the temporary reconversion of vacant university areas and halls as well as the implementation of mobile clinics and light structures in open spaces. In Jakarta, vaccination points were set up in vacant halls, parking lots, schools and malls. In New York City and Milan, vaccination centres ranged from small spaces to large community halls. In all cases, the temporariness of these structures was central, as they were conceived to be quickly moved to new locations based on the reopening of the former functions and the evolution of the vaccination campaign. Interestingly, the evolution of

the vaccination campaign has not resulted in the mobilisation of new constructions apart from tensile structures in open spaces for drive-through vaccination sites. In Milan, an early approach to vaccination based on an initiative of the national government aimed to put in place thousands of newly built standardised temporary pavilions in cities' main squares; after contestations and local rejections, this proposal was soon dismissed, and one previously empty structure became the most important vaccination facility in Milan's metropolitan area.

Overall, in relation to vaccination—the emptiness of assets as produced by both the pandemic itself and the following restrictions and measures—turned out to be advantageous in providing strategic solutions and massive availability in the short term. However, some technological preconditions, such as the need for refrigerated storage areas, dictated the types of vacant spaces that could be used. Further, in several instances, vaccination campaigns could be hosted in vacant or empty spaces that had already been used for performing other pandemic-related functions (e.g., Jakarta, Esfahan and Karachi).

Discussion

Temporariness, emptiness and improvisation in uncertainty

The previous section provided an overview of the responses to COVID-19 in relation to four health-related functions: testing and screening, hospitalisation, quarantine and vaccination. As a result of this analysis, various considerations emerged. First, if we argue that the pandemic was an essential test of how everyday practices and urban policymaking deal with times of radical uncertainty (see Balducci et al. 2011; Beck 2006), the results of the analysis show that improvisation and temporary interventions became the norm in the setting up of health responses to the pandemic. This is not surprising, as cities were mostly unprepared to face the functional needs prompted by the COVID-19 pandemic—needs that contingency and emergency planning very rarely specifically addressed. Only cities that had a legacy of planning in disease control had such provisions for pandemics specified in their contingency plans (e.g., New York City), and this was unusual (Connolly et al. 2020).

Furthermore, as most projects required the temporary refunctionalisation of buildings or public spaces that were either previously unused or vacant due to the pandemic, traditional spatial planning devices (e.g., zoning, land use regulations and building codes) were made irrelevant. This confirms once again the complex, conflictual relationship between temporary use and spatial planning (see Andres and Kraftl 2021). At the other end of the spectrum lies the choice of a few cities (e.g., Moscow

and Abu Dhabi in this study) to capitalise on the emergency to implement longer term plans, thus not leveraging vacancy and its temporary use as strategic resources but accelerating certain permanent new building projects and the development agendas that supported them. Here, ruling powers opted for a use of the emergency that confirms the standard way of doing things instead of experimenting.

Second, the inherited urban geographies and the availability of economic resources of specific places or social groups appear to have been an important factor in shaping both temporary responses and the role and significance of vacancy. Cities characterised by de facto divisive urban planning—such as Abu Dhabi in this study (Mohammad and Sidaway 2012)—replicated that approach, leveraging the temporary refunctionalisation of the same previously spatially divided geographies (divisions that, arguably, also contributed to the specific forms assumed by the pandemic in such contexts; see Tazyeen et al. 2021). In cities characterised by a high degree of informality (e.g., Mumbai, São Paulo and Karachi), policymakers had to design very low-investment responses able to fit the specific morphologies of informal settlements while addressing the needs of a population that, due to density and poverty, was particularly vulnerable (Kamalipour and Peimani 2021; Sengupta and Jha 2020; Surbhi et al. 2021). Although it has been shown that exposure to the virus and disease severity was very socially uneven in cities of both Global North and the Global South (Coppola 2021; Huang and Li 2022), cities in the latter context more clearly demonstrate how the geography of temporary interventions is often the outcome of clear, outright forms of spatial segregation, polarisation and inequality. Also, the scarcity of resources in certain contexts resulted in minimal interventions (e.g., in Esfahan) or, interestingly, in interventions that fully mobilised existing vacant structures (e.g., in Mumbai and Jakarta) with very low economic input. Further, cities with more extensive and ongoing experience with risks and disasters (e.g., Jakarta) showed a great amount of organisational know-how, affecting the way in which temporary uses of vacant spaces were mobilised.

Third, the temporariness of the analysed structures and their relationship with vacancy present profound commonalities with what can be observed in post-disaster and post-crisis contexts, along with a higher degree of complexity. Vacancy produced by the pandemic (e.g., of accommodations, exhibition centres, sport venues, schools and churches) played the strategic role that it traditionally plays in times of natural disasters. However, temporariness and vacancy during the COVID-19 pandemic were less structured and stable concepts: the decision to use vacant assets for temporary functions had to

be based on assessments of when these sites would again be needed for their regular functions. This decision was easier in the context of the widespread lockdowns of 2020, as the need for hospitalisation, testing and quarantine solutions proceeded quite coherently with spatial containment measures and the emptying of cities. However, this assessment grew in complexity as vacant and available spaces became more erratic, changes in regulations more sporadic and pressures to preserve or restore the functionality and accessibility of certain public functions increased. Vacancy has thus presented a challenge and an opportunity as a part of pandemic urbanism, and the cases show how different rationalities and strategies have made emptiness in the urban space visible or invisible (O'Callaghan and Di Feliciano 2021). Cities were forced to adapt to evolving challenges related to the pandemic while being able to return to almost normal circumstances during phases of relative stability (Andres et al. 2021). Flexibility and adaptability, as well as the broader concept of resilience, appear to have been crucial as temporary solutions shifted in response to both technological changes and the evolving phenomenology of the disease (Pasqui 2022). Illustrating this, quarantine centres referred to the identified duration of the infectious conditions under successive variants and vaccination campaigns, while the design of temporary structures hosting vaccination centres depended on the availability, specific transportation and conservation needs of the different vaccines. Testing centres, too, changed following the evolution of testing techniques, and particularly the expansion of self-testing. Further, the use and significance of temporary hospitals depended on changes in the virus' severity and symptoms and on the effectiveness of cures across the successive variants. In sum, the pandemic highlighted how temporariness in relation to vacancy can be rapidly and efficiently mobilised during times of uncertainty, unprecedented challenges and sudden changes in the urban space. If compared to standard post-disaster situations, the response was subject to complex calculations related to a higher variability, due to the nature of *moving disaster* of the pandemic itself.

Fourth, the spatial response outlined in this study relates to the situated social and political preferences of actors in the studied cities. Across contexts, the social acceptability of certain temporary solutions and the framing of vacancy itself varied greatly. On one hand, in some cities, the use of certain spaces for pandemic-related functions was unlikely because there were greater pressures to maintain their originally intended uses (e.g., schools). On the other hand, local and national governments were compelled to make choices and take actions to discern the socially acceptable solutions from the others. For example, in certain contexts, places of worship

were kept open (e.g., Milan and Karachi), while in others they were closed. Differently, churches in New York City were temporarily refunctionalised and used for hospitalisation, quarantine and testing. In the same city, parks were used for some of these functions, igniting conflicts and controversies. These examples help us to understand that in times of sudden disruption and global uncertainty, vacancy and its potential temporary use are subject to social, spatial and cultural controversies. Vacancy is not purely a technical concept, and neither are the temporary ways to leverage it. They are socially constructed objects and practices whose perceived legitimacy can greatly vary in degree and form across different contexts.

Vacancy and temporariness after the pandemic: technical optimization or deeper innovation?

At the outset of this study, we argued that an increased awareness of the strategic role of vacancy and temporariness in urban planning and policymaking under conditions of growing, if not radical, uncertainty is one of the key legacies of the COVID-19 pandemic. The pandemic revealed a different, more complex structure than that revealed by other disasters or by the conditions of urban crisis and disinvestment that have been common references in debates and practices related to vacancy and temporariness in past decades. The spread of COVID-19 was a slow-motion, temporally stratified and intermingled process that fuelled a specific type of response—one featuring spatial containment, cure organisation and life adaptation—that produced complex, reciprocal feedbacks. Differently from more known disasters, the dimension of technical rationality, which is behind every policy response in the context of a disruption, had to be incrementally built in an unstable, evolving environment and largely in the lack of any a pre-existing, specific regulations and established routines.

As we have seen, a common response was the mobilisation of a variety of arrangements as ad hoc physical solutions. Temporary structures related to testing, hospitalisation, quarantine and vaccination appeared in cities all over the world as highly visible spatial responses. Such structures offered immediate, pragmatic answers to unexpected conditions and exposed the versatility of open spaces and buildings at a scale and intensity that was never experienced before. This reopened the debate on the role of vacancy and temporariness in emptied cities, giving scholars and practitioners the opportunity to innovate such debates. We are not referring here to the debates on long-term socio-spatial outcomes of the pandemic—e.g., the decline of the role and relevance of office spaces in connection with the possibilities of remote working—rather on how vacancy and temporariness are framed and operated as structural properties of urban

environments that can be mobilised for specific purposes in the context of disruptions.

In the incoming years, urban planners and policy makers will have to critically re-examine the legacy of the pandemic response, having to position themselves either for a lesser ambitious technical optimisation of existing planning provisions and procedures or for a more reformist approach centred on leveraging vacancy and temporariness as the key strategic devices to respond to future crisis. They may certainly consider the opportunity to include in contingency planning the identification of areas or structures suitable for the setting up of the functions discussed in this paper in the case of a comparable event. This would not be particularly new per se, as the provision of spaces for temporary functions in post-disaster conditions is a long-standing concern for urban planners and policy-makers (Coppola et al. 2021a). However, vacancy and temporary uses in the context of a pandemic present a spatiality and temporality that are consistently different from that of more known disasters, making this kind of innovation more difficult, unstable and in need of deeper regulative changes.

The impact of COVID-19 on cities has highlighted the abundance of existing buildings and urban spaces both already empty and left empty by intermittent drops in human activities implied by the evolution of the pandemic. Recognising the opportunity presented by the temporary employment of such vacant spaces in crisis-management is increasingly crucial. However, this shows the need for new regulations and management strategies that guide actions during waves of pandemic disruption, effectively transitioning vacant spaces for temporary solutions to the needed uses, allowing urban dwellers to access them. Such increased preparedness on how to leverage vacancy would protect cities from opportunistic uses of the emergency to support previous, permanent plans and initiatives, from needing to implement costly solutions at later stages (e.g., decommission), and from inequitable or precarious socio-spatial effects on certain communities at present.

But this is not an easy endeavour. A reformist approach would imply a reframing of public rights on certain private assets under certain conditions, on the footing that their temporary use to perform specific functions during a crisis is of public interest. During the pandemic, responses involving private properties were based on swift, specific agreements between public authorities and private actors such as hotels, private services, exhibit centres' managing entities. It would be optimal learning from the COVID-19 response and exploring ways to make temporary vacancy of certain assets an expected and regulated status for certain spaces and buildings in cities. This would imply difficult transactions with

interested parties and some engaged conversation on what functions can be planned to be suspended and the relative buildings vacated. This points to the issue of the varying social legitimization of vacancy and temporary uses in different contexts that we mentioned. At the same time, a reformist approach would also involve some theorising on how the temporary use of vacant assets must be a response to the subjective rights of social groups that—as we have seen—are particularly vulnerable to the impacts of a pandemic and similar risks. Again, as an example, projects of quarantine spaces were based at best on rapid assessments of needs in a context of sub-optimal quantitative response. This left large sections of vulnerable social groups—living in overcrowding conditions or needing special assistance—at the margins of a response that was not able to mobilise enough (vacant) space for all the ones in need. Better informed planning on the right amount of vacant space that could be made available and transformed and an assessment of the activable assets would be of great importance in this perspective. Regulative issues related to the statute of property and issues spatial justice would be at the core of a thorough examination of what can we learn from the temporary use of vacant space as a strategic response to in a world of radical uncertainty. This conversation is by all means already belated.

Acknowledgements

Authors wish to acknowledge and thank the students who participated in the research effort.

Author contributions

The authors equally contributed to all sections of the manuscript.

Funding

This study was funded by the European Union—NextGenerationEU, Mission 4, Component 2, in the framework of the GRINS-Growing Resilient, Inclusive and Sustainable project (GRINS PE00000018-CUP D43C22003110001). The views and opinions expressed are solely those of the authors and do not necessarily reflect those of the European Union, nor can the European Union be held responsible for them.

Data availability

Considered the nature of the data used in the research, no datasets is made available.

Declarations

Competing interests

The authors report that there are no competing interests to declare.

Received: 14 December 2023 Accepted: 31 May 2024

Published online: 17 October 2024

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Sara Caramaschi is a postdoctoral scholar and lecturer in urban studies at DASTU – Politecnico di Milano. She has held research, teaching and visiting appointments at several institutions in Italy and abroad. Her research focuses on the evolution, meanings, and uses of the built environment, as well as temporary urbanism and processes of emptiness in contexts of urban contraction and post-crisis cities. Her work has been featured in journals such as *Urban Geography*, *Planning Theory & Practice*, the *International Journal of Housing Policy*, *European Urban and Regional Studies*, *disP–The Planning Review*.

Alessandro Coppola is Associate Professor DASTU, at Politecnico di Milano, Italy. He has had research, teaching and visiting appointments at several institutions in Italy and abroad. His research interests include housing, urban policies and governance, post-crisis contexts. His work has been featured in journals such as *Urban Geography*, *Urban Studies*, *Cities*, *European Planning Studies*, *Progress in Planning*, *International Journal of Housing Policy*.